Digital Clock Project Report

1. Title Page

Project Title: Digital Clock
Course: Programming in C
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Academic Year: 2025–26

2. Abstract

This project implements a Digital Clock using the C programming language. The primary objective is to display the current time in hours, minutes, and seconds, updating dynamically on the console.

The project demonstrates:

- Loops and modular functions
- Header files (`time.h`, `unistd.h`, `windows.h`)
- Delay functions (`Sleep()`, `usleep()`)
- Formatted output (`printf()`)

Applications include embedded systems, IoT devices, and real-time monitoring tools.

3. Problem Definition

Clocks are essential in both physical and digital systems. In programming, simulating a clock requires handling time values, updating them continuously, and formatting the output.

Goals:

- Display time in HH:MM:SS format
- Update every second
- Run continuously until terminated
- Demonstrate modular coding practices

Constraints:

- Accuracy of delay functions
- Portability across operating systems
- User termination handling

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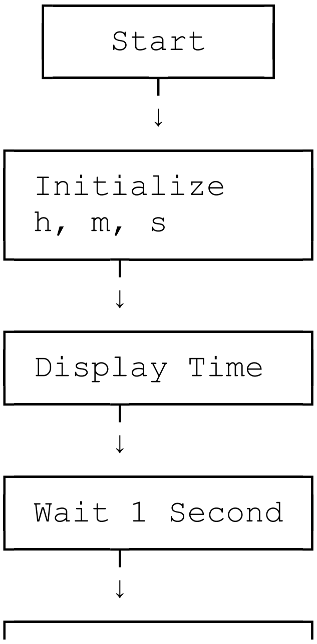
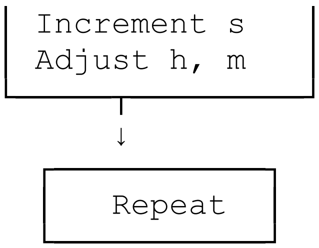
4. System Design

4.1 Algorithm

1. Start
2. Initialize time variables (hours, minutes, seconds)
3. Display time in HH:MM:SS format
4. Wait for one second
5. Increment seconds, adjust minutes/hours when needed
6. Repeat steps 3–5 continuously

4.2 Flowchart





5. Implementation Details

5.1 Code Snippet

```
#include <stdio.h>
#include <time.h>
#include <unistd.h>

void displayTime(int h, int m, int s) {
    printf("%02d:%02d:%02d\n", h, m, s);
}

int main() {
    int h = 0, m = 0, s = 0;
    while(1) {
        displayTime(h, m, s);
        sleep(1);
        s++;
        if(s == 60) { s = 0; m++; }
        if(m == 60) { m = 0; h++; }
        if(h == 24) { h = 0; }
    }
    return 0;
}
```

5.2 Concepts Used

- **Loops:** `while`, `for`
- **Functions:** Modular design (`displayTime`)
- **Header Files:** `time.h`, `unistd.h`
- **Delay Functions:** `sleep()` for Linux, `Sleep()` for Windows
- **Formatted Output:** `printf("%02d:%02d:%02d")`

6. Results & Sample Output

```
=== Digital Clock ===
30-11-2025
03:08:08 PM

=== Digital Clock ===
30-11-2025
03:08:09 PM

=== Digital Clock ===
30-11-2025
03:08:10 PM
```

Edge Cases:

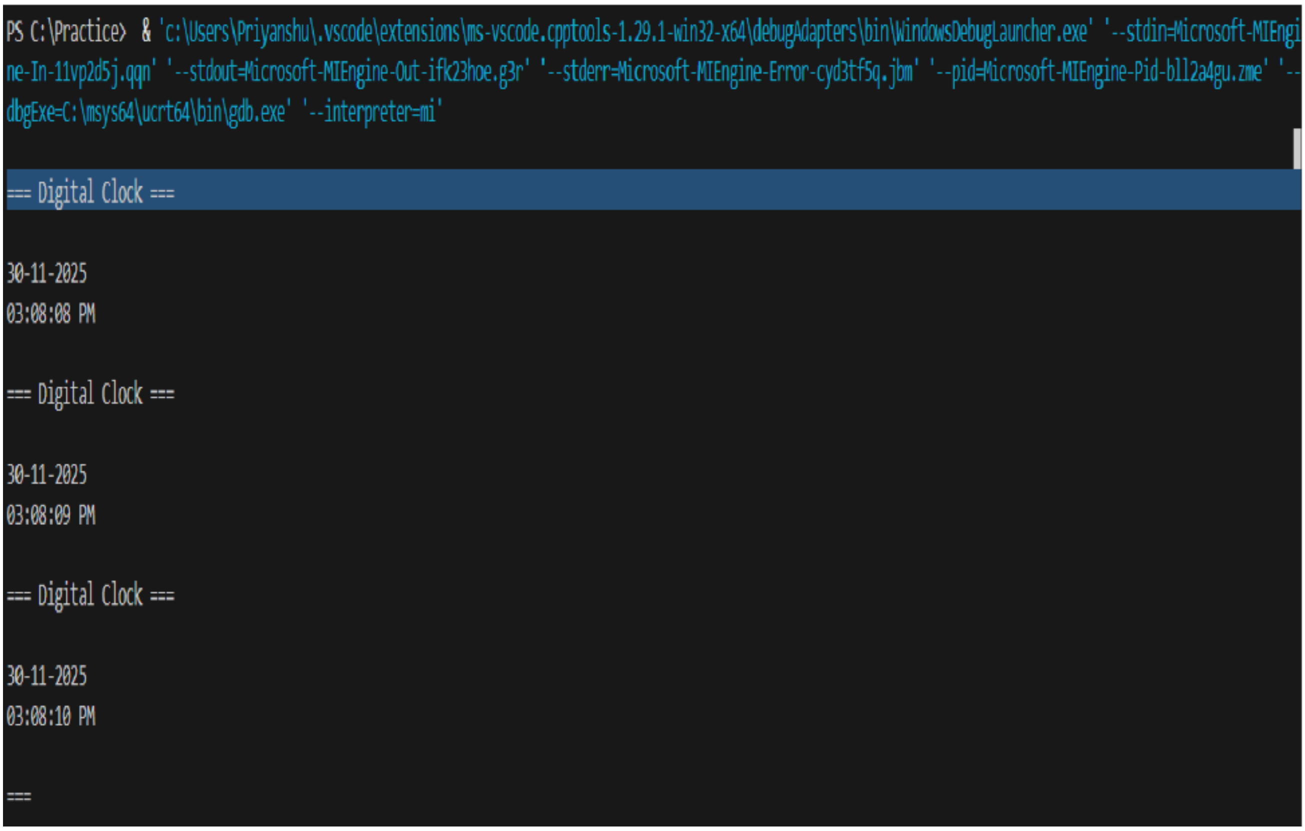
- Midnight rollover (00:00:00)
- Noon (12:00:00 PM)
- Continuous running without lag

7. Conclusion & Future Work

The Digital Clock project successfully simulates a real-time clock in the console using C.

Future Enhancements:

- Add alarm functionality
- Display date along with time
- Provide 12-hour/24-hour format toggle
- Build a GUI version
- Synchronize with system/NTP time



```
PS C:\Practice>  & 'c:\Users\Priyanshu\.vscode\extensions\ms-vscode.cpptools-1.29.1-win32-x64\debugAdapters\bin\WindowsDebugLauncher.exe' '--stdin=Microsoft-MIEngi
ne-In-11vp2d5j.qqn' '--stdout=Microsoft-MIEngine-Out-ifk23hoe.g3r' '--stderr=Microsoft-MIEngine-Error-cyd3tf5q.jbm' '--pid=Microsoft-MIEngine-Pid-bll2a4gu.zme' '--
dbgExe=C:\msys64\ucrt64\bin\gdb.exe' '--interpreter=mi'

=== Digital Clock ===

30-11-2025
03:08:08 PM

=== Digital Clock ===

30-11-2025
03:08:09 PM

=== Digital Clock ===

30-11-2025
03:08:10 PM

===
```